

## PATENT ABSTRACTS OF JAPAN

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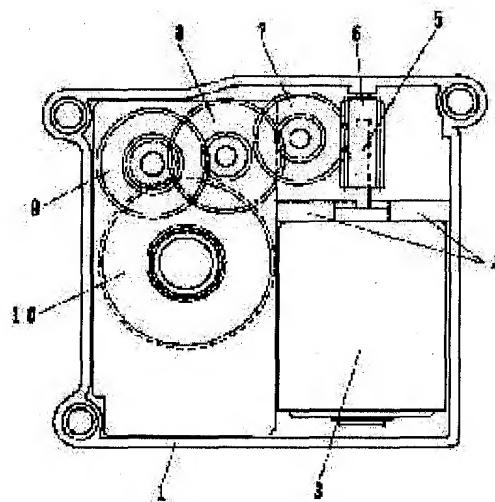
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### (54) GEARED ACTUATOR

#### (57)Abstract:

PROBLEM TO BE SOLVED: To make it possible to prevent the generation of unusual sounds caused by the clearance between a shaft and a metal by a simple method, even if the motor is not strictly controlled.

SOLUTION: To the output shaft 5 of the driving motor 3 of this geared actuator, a first gear 6 is fitted, and this first gear 6 is provided with at least one gear linked to it. For generating lateral pressure in this output shaft 5, a pressing means which presses at least one gear excluding the first gear 6 in the axial direction is provided.



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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] this invention relates to the \*\*\*\*\* actuator which transmits a motor output to the exterior through the gear connected with one step or two or more steps, and it is related with specifically preventing that different sound occurs from a motor.

[0002]

[Description of the Prior Art] The \*\*\*\*\* actuator which transmits the output of a motor to the exterior from the former through the various gears connected with one step or two or more steps is proposed. In this conventional \*\*\*\*\* actuator, the worm gearing and the pinion gear were inserted in the output shaft of the motor for a drive by pressing etc., the worm gearing or the pinion gear was rotated with the power which occurred by the motor, and the output of a motor was transmitted to the exterior through the gear which is interlocked with rotation of the gear with which this output shaft was equipped, and was connected with two or more steps.

[0003]

[Problem(s) to be Solved by the Invention] However, when it is used by having built the above conventional \*\*\*\*\* actuators into the set, in order that such the status and the status that it does not cut might arise [ a load ] from a set side in a certain fixed operation, the different sound of the actuator generated when this external load stops starting had become the problem. That is, between the shaft-metal of the motor for a drive carried in the \*\*\*\*\* actuator, path clearance existed with small, and different sound had occurred by this path clearance backlash in the status that an external load is not applied. Therefore, in order to prevent occurrence of this different sound, in the former, measures were taken by the motor.

[0004] However, although the path clearance between shaft-metal was managed severely and there was the technique of preventing the path clearance backlash of a shaft by also making it bias the field balance of a motor intentionally to take the measures by the motor, and drawing Rota near to one side, occurrence of the different sound could not be prevented anyway completely, but it has already been a limitation only as the cure of a motor.

[0005] Then, this invention will offer the \*\*\*\*\* actuator which can prevent occurrence of the different sound which originates in the path clearance between shaft-metal by easy technique even if it solves the above-mentioned problem and it does not manage a motor severely.

[0006]

[Means for Solving the Problem] Paying attention to the contact section of the 1st gear and the 2nd gear with which the output shaft was equipped, by working on this 2nd gear in a rotation load as an example, as the \*\*\*\*\* actuator of this invention makes the force in which a lateral pressure is applied to the output shaft of the motor for a drive act, it can prevent occurrence of the different sound which originates in the path clearance between shaft-metal by easy technique.

[0007]

[Embodiments of the Invention] In order that this invention may make the aforementioned output shaft generate a lateral pressure in the \*\*\*\*\* actuator which comes to have at least one gear which the output shaft of the motor for a drive is equipped with the 1st gear, and is interlocked with this 1st gear, it comes to prepare a press means to make shaft orientations press at least one gear except the 1st aforementioned gear.

[0008] As for the aforementioned press means, it is good to be the elastic body with which the shaft-orientations loosely-fitting section of at least one gear was equipped. Moreover, the aforementioned press means may give elasticity to the bearing section of at least one gear. And it is effective if the aforementioned press means is prepared in the 2nd gear connected with the 1st aforementioned gear.

[0009]

[Example] Drawing 1 is a plan of the \*\*\*\*\* actuator in one example of this invention, and drawing 2 is a side elevation of the \*\*\*\*\* actuator in drawing 1. In drawing 1, 1 is the 1st case which consists of resin molding, and constitutes housing H with the 2nd case 2 mentioned later. The motor for a drive 3 is carried in this housing H, and the position fixes this motor 3 by the projected part for a motor positioning 4 formed in the 1st case 1. And the worm gearing 6 which is the 1st gear is inserted in the output shaft 5 of a motor 3 by pressing etc.

[0010] Moreover, as an operation of a worm gearing 6 is interlocked with in housing H, the 3rd, the 4th gear 8 and 9, and the output gear 10 are connected with two or more steps from the 2nd gear 7. A worm gearing 6 rotates with the power which

occurred by the motor 3, and the motor output which is interlocked with rotation of this worm gearing 6, and was changed into predetermined torque through the 2nd or 4th gears 7, 8, and 9 and output gear 10 is transmitted to the exterior.

[0011] Moreover, as shown in drawing 2, in housing H which consists of the 1st and the 2nd case, the shanks 17 and 18 (not hereafter shown) for supporting the 2nd or 4th gears 7, 8, and 9 and output gear 10 respectively free [ rotation ] are arranged.

[0012] Here, 11 is the metallic nature wave washer inserted in the shank 17 of the 2nd gear 7, and gives an example of the press means of this invention. Namely, the loosely-fitting section of housing H and the 2nd gear 7 is equipped with this metallic nature wave washer 11, and it is made to press the 2nd gear 7 according to the spring force of the metallic nature wave washer 11 in the orientation of y in drawing.

[0013] If it does in this way, since it is in contact with boss section 2a of the 2nd case 2, frictional force will generate the 2nd gear 7, and this frictional force will act as a rotation load of the 2nd gear 7. And occurrence of the different sound resulting from the path clearance between shaft-metal can be prevented, without applying a lateral pressure to the worm gearing 6 of a motor 3, and being influenced by the status of an external load like the principle later mentioned by work of this rotation load.

[0014] Next, based on drawing 3, the principle of the different sound prevention in the \*\*\*\*\* actuator of this invention is explained. namely, -- although the 2nd gear 7 is what rotates in the orientation of CW as shown in this drawing (a) -- this 2nd gear 7 -- a rotation load -- being applied (the 2nd gear 7 being pressed by shaft orientations) -- a load acts on the contact section of a worm gearing 6 and the 2nd gear 7 in the orientation of CCW

[0015] Since the contact section theta\*\* Leans, this load force will be committed as force F in the orientation right-angled to this. And it will be decomposed into the orientation component  $F_x (=F \sin \theta)$  of x, and the orientation component  $F_y (=F \cos \theta)$  of y, and this force F can prevent occurrence of the different sound which a lateral pressure will be applied to a worm gearing 5, suppresses a shaft deflection, and originates in the path clearance between shaft-metal according to this force  $F_x$ .

[0016] Moreover, as shown in this drawing (b), when it was referred to as the distance y in the a root sections of an output shaft 5, and the force  $F_x$  acts in b points and it is referred to as the distance 10y, in order to end with 1/10 of lateral pressure to a points, even if it is few force  $F_x$ , occurrence of different sound can be prevented.

[0017] In addition, this invention is not limited to the above-mentioned example, in the domain which does not deviate from the main point of this invention, can be changed suitably and can be carried out. For example, the output shaft of the motor for a drive may be equipped not a worm gearing but a pinion gear. In this case, the force can act on the contact section of a pinion gear and the 2nd gear at a tangential direction, and a lateral pressure can be applied to the output shaft 5 of a motor 3 like the time of a worm gearing.

[0018] Moreover, if a press means is the gear group connected with two or more steps instead of one step, it should just be constituted by at least one not only of the 2nd gear but the gear group of its. When a press means is prepared in the 2nd gear as the example, the end play of the 2nd gear can be lost and the gear sound generated between [ other than the different sound resulting from the path clearance between shaft-metal ] a worm gearing and the 2nd gear can be stopped.

[0019] Moreover, further, the elastic body of not only a metallic nature wave washer but rubber nature or plastics nature is sufficient, and as shown in drawing 4, even if a press means forms slot 12a etc. in a part of gear bearing section 12 and gives elasticity, it does not interfere, and even if it gives elasticity to the contact section of the gear bearing section 12, it is not cared about. Moreover, although the motor for a drive and two or more gear groups are arranged in the above-mentioned example in housing which consists of the 1st and the 2nd case, even if it is the thing of the type which arranged two or more gear groups in the motor simple substance, it is fully applicable.

[0020]

[Effect of the Invention] Occurrence of the different sound which the force of applying a lateral pressure to the 1st gear since a press means to press at least one gear described above excluding the 1st gear according to [ like ] this invention to shaft orientations is established can be made to act, suppresses a shaft deflection by easy technique, and originates in the path clearance between shaft-metal can be prevented. In addition, especially in that case, the \*\*\*\*\* actuator which became unnecessary to manage a motor severely and was excellent in the reliability can be offered.

[0021] Moreover, as the aforementioned press means, if elasticity is given to the bearing section of at least one gear, since parts mark do not increase, a productivity will not be spoiled. Moreover, if the shaft-orientations loosely-fitting section of the 2nd gear is equipped with the aforementioned press means, the end play of the 2nd gear is lost and the gear sound generated between [ other than the different sound resulting from the path clearance between shaft-metal ] a worm gearing and the 2nd gear can be stopped.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the plan of the \*\*\*\*\* actuator in one example of this invention.

[Drawing 2] It is the side elevation of the \*\*\*\*\* actuator in drawing 1.

[Drawing 3] It is drawing explaining the principle of the different sound prevention in the \*\*\*\*\* actuator of this invention.

[Drawing 4] It is drawing having shown an example of a press means in the \*\*\*\*\* actuator of this invention.

[Description of Notations]

H .... Housing

1 .... The 1st case

2 .... The 2nd case

3 .... Motor for a drive

5 .... Output shaft

6 .... The 1st gear

7 .... The 2nd gear

11 .... Press means

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[Translation done.]

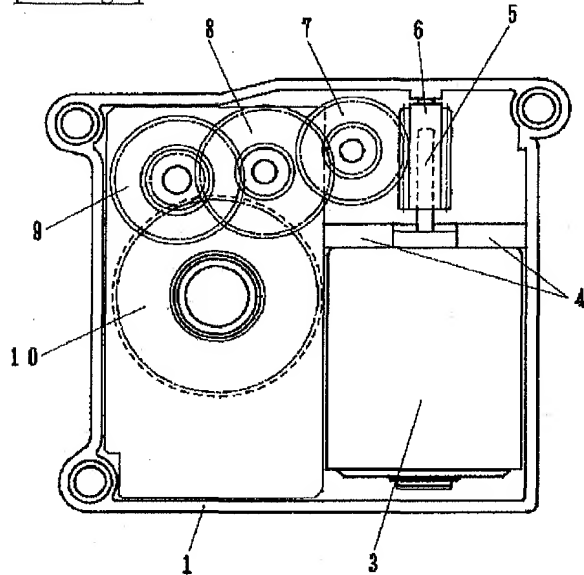
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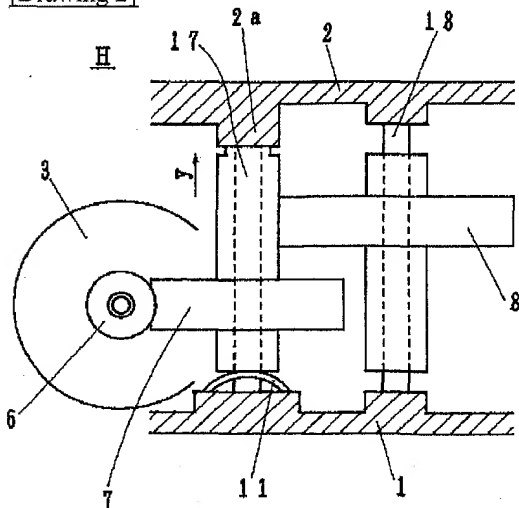
DRAWINGS

[Drawing 1]

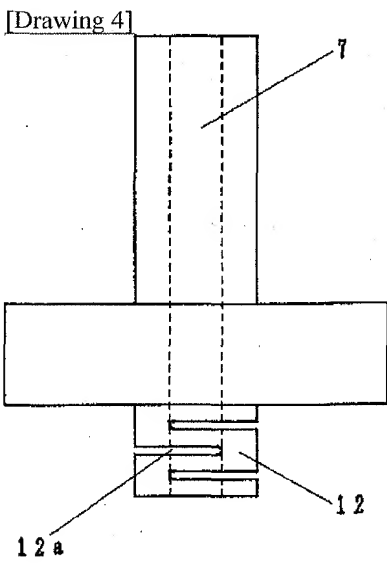
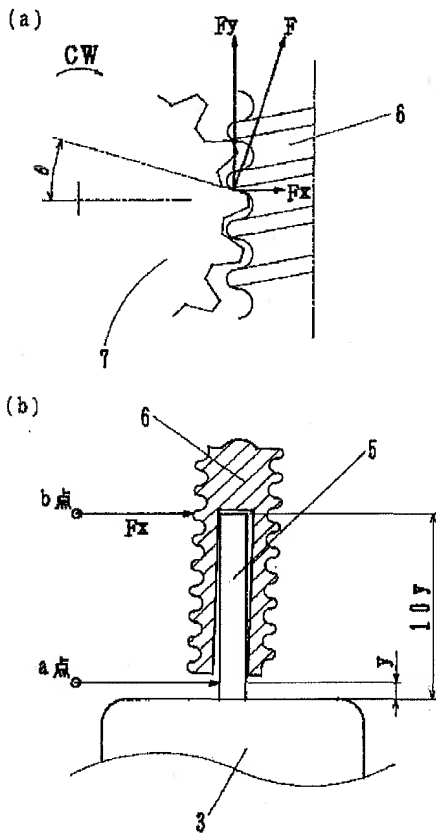


- 1: 第1のケース  
3: 駆動用モータ  
5: 出力軸  
6: 第1のギヤ  
7: 第2のギヤ

[Drawing 2]



[Drawing 3]



[Translation done.]